

Best Practice Seminar: Firefighting in North Carolina

October 13th, 2006

University of North Carolina – Chapel Hill
School of Government
www.sog.unc.edu

Contents

General Statistics	2
Response Protocols	4
Deployment Strategies	12
Fire Inspection Strategies	17
Service Delivery	
Communication	
Counting Methods	
Risk-Based Strategy	
False Alarms	25
Equipment	21
Preventative Maintenance	
Replacement Standards	
Best Practices	
Firefighter Work Schedule	28
Salary	36

General Statistics

I. National Fire Protection Association – 2005

Nature of Fire Department Calls (Percentage of Total Calls)

Medical Aid:	61.82
Other	12.94
False Alarms:	9.18
Fires:	6.89
Mutual Aid:	4.69
Other Hazardous Conditions:	2.87
Hazardous Materials:	1.61

NFPA Fire Department Calls, 2005

<http://www.nfpa.org/assets/files/PDF/OSFDcalls.pdf>

II. United States Fire Administration – 2006

Response Time & Suppression Statistics

In most of the analyses done here, response times were less than 5 minutes nearly 50% of the time and less than 8 minutes about 75% of the time. Nationally, average response times were generally less than 8 minutes. The overall 90th percentile, a level often cited in the industry, was less than 11 minutes

Fires have a better chance of having a response time of less than 5 minutes between noon and 6pm (49%). Only 40% had a response time of less than 5 minutes between midnight and 6am.

Mean Response Times v. Flame Spread

Confined to object of origin:	6.6 minutes (response time)
Confined to room of origin:	6.2 minutes
Confined to floor or origin:	6.7 minutes
Confined to building of origin:	7.5 minutes
Beyond building of origin:	8.3 minutes

U.S. Fire Administration: Structure Fire Response Times, January 2006

<http://www.usfa.dhs.gov/downloads/pdf/tfrs/v5i7.pdf>

<http://www.usfa.dhs.gov/statistics/reports/pubs/tfrs.shtml> (additional USFA reports)

Response Protocols

I. Loudoun County, Virginia - 2005

The following apparatus and/or resources shall be dispatched in response to a second or greater alarm request at a fire incident:

Second Alarm

- 3 – Engines
- 1 – Truck of Special service (may either be a truck, tower ladder, quint, fire squad, or rescue engine)
- 1 – ALS Ambulance (alternate ALS & BLS with each additional alarm)
- 1 – Command Officer
- 1 – Air Unit
- 1 – Canteen

Third Alarm

- 3 – Engines
- 1 – Truck or Special Service
- 1 – BLS ambulance
- 1 – Command Officer
- 1 – Mobile Command Post

Fourth Alarm

- 3 – Engines
- 1 – Truck or Special Service
- 1 – ALS Ambulance
- 1 – Command Officer
- 1 – Air Unit

Fifth Alarm

- 3 – Engines
- 1 – Truck of Special Service
- 1 – BLS Ambulance
- 1 – Command Officer

The Incident Command may request individual units or unit types at any time. Supernumerary apparatus or resources that are already responding or on scene shall be counted towards the next alarm assignment.

Loudoun County Fire and Rescue System Guideline: Dispatch of Second and Greater Fire Alarms, June 2005
http://inetdocs.loudoun.gov/fire/docs/policiesandguid/_firerescuecommi_/commissionfrgs_/frgoperation_/currentversions_/index.htm

II. Elizabeth City, North Carolina – Effective 2001

The basic alarm assignments are as follows:

First Alarm

- Battalion Chief
- Station 1 Engine
- Station 2 Engine
- Station 1 Ladder

Second Alarm

- Mutual Aid Engine (of district assignment is in)
- Station 16 Ladder
- Station 1 and 2 Shift Recall
- Elizabeth City Volunteers to the scene
- Command Staff Recall

Third Alarm

- Station 1 Reserve Engine and Personnel
- Station 2 Reserve Engine and Personnel
- Station 8 Air Van

Fourth Alarm

- Mutual Aid Engine
- Mutual Aid Engine
- Mobile Command Post

Fifth Alarm

- Mutual Aid Engine
- Mutual Aid Engine

The Incident Commander has the right to upgrade any alarm assignment, as well as downgrade an assignment. Any equipment not listed on the alarm assignments may be requested by the Incident Commander along with extra personnel at anytime during the incident.

Elizabeth City Greater Alarm Assignments Standard Operating Guidelines, April 2001
http://www.ecfdlife.org/SOG/GREATER_ALARM_ASSIGNMENTS.pdf

III. Brunswick Fire Department, Georgia – 2006

For a fire incident in the City of Brunswick, the response will include:

- Three engine companies
- 10 – 13 firefighting personnel
- Aerial piece (if staffing permits)

Secondary response units will be notified and respond:

- Brunswick Fire Chief
- Three fire prevention officers.

Non – Fire Related Emergencies: The response will include one engine company for an EMS call

http://brunswickga.org/nm/publish/news_15.phtml

IV. Loudon County, Virginia – 2005

NFPA 1720 Response Goals (Loudon County fire suppression response aligns with these standards)

<u>Demand Zone Demographics</u>	<u>Staffing/Response Time</u>	<u>Achievement %</u>
Urban (>1000 people/mile ²)	Staff-15/Response Time-9 minutes	90
Suburban (500-1000 people/mile ²)	Staff-10/Response Time-10 minutes	80
Rural (<500 people/mile ²)	Staff-6/Response Time-14 minutes	80
Remote (Travel distance > 8 miles)	Staff-4	90

* (Remote) Upon assembling the necessary resources at the emergency scene, the fire department should have the capability to safely commence an initial attack within two minutes.

Minimum Apparatus Staffing Levels: Combined System

<u>Apparatus Type</u>	<u>Minimum Staffing Level</u>
Engine Companies	3
Ladder Companies	3
Heavy Squad Companies	3
Tanker Companies	1

Other Jurisdictions' Staffing Levels

Locality	Engine	Ladder	Tanker	Heavy Squad	BLS Ambulance	ALS Ambulance
Henrico County, Virginia	3	3	No data	3	2	2 Staffing requires 1 ALS Provider
Chesterfield County, Virginia	4 ²⁵	3	No data	No data	2	2 Staffing requires 1 ALS Provider
Prince William County, Virginia	3	3 ²⁶	1	3	2	2
Howard County, Maryland	3	4	2	4	2	2 Staffing requires 1 ALS Provider

Vehicle/Apparatus Needs

Primary response vehicle (Engines/Ladders/Squads/Tankers/Ambulances/Brush Trucks) location is based on several factors. The demand for service (population--Capital Intensity Factor), and time and distance to travel to the emergency as it relates to response goals represents the driving forces for determining the placement and deployment of primary response vehicles.

Table 20 - Fire and Rescue Apparatus Capital Intensity factor Criterion

Eastern Loudoun	Vehicle Type	Population Factor
Fire & Rescue	1500-gpm Engine	1:10,000 population
Fire & Rescue	ALS Ambulance	1:10,000 population
Fire & Rescue	Ladder Truck	1:25,000 population
Fire & Rescue	Heavy Rescue Squad	1:50,000 population
Western Loudoun		
Fire & Rescue	1500-gpm Engine	1:10,000 population
Fire & Rescue	ALS Ambulance	1:10,000 population
Fire & Rescue	Tanker	1:10,000 population
Fire & Rescue	Brush Truck	1:10,000 population
Fire & Rescue	Heavy Rescue Squad	1:50,000 population
Fire & Rescue	Ladder Truck	1:25,000 population

Volunteer companies traditionally equip each station with two or more Engines (pumpers), and two or more Ambulances when they provide EMS service. Ladder Trucks, Heavy Squads, Tankers, and Brush Trucks are placed in companies as a single apparatus unit when the company provides these services.

V. Kansas City, Missouri – 2003

Ground Staffing recommendations of the Commission on Fire Accreditation, Int'l

Low Risk: Fires involving small sheds and other outbuildings, larger vehicles; characterized by sustained attack fire flows typically less than 250 gallons per min.

Moderate Risk: Fires involving single family dwellings and equally sized commercial buildings; sustained attack flows range between 250 and 1,000 gallons per minute

High Risk: Larger commercial properties with sustained attack flows between 1,000 and 2,500 gallons per minute

Maximum Risk: Fires in buildings with unusual hazards such as high rise buildings, hazardous material facilities, nursing homes, hospitals, etc.; These facilities may not require more water but require more personnel at the scene

Minimum Firefighting Personnel Needed Based Upon Level of Risk

Task	Maximum Risk	High Risk	Moderate Risk	Low Risk
Attack Line	4	4	2	2
Search and Rescue	4	2	2	
Ventilation	4	2	2	
Back-Up Line/Rapid Intervention	6	6	4	2
Pump Operator	1	1	1	1
Water Supply	1	1	1	
Utilities Support	1	1	1	
Command/Safety	2	2	2	1#
Forcible Entry	*			
Salvage	*			
Overhaul	*			
Communication	1*			
Operations Section Chief	1			
Logistics	1			
Planning	1*			
Staging	1*			
Rehabilitation	1			
Division/Group Supervisors	2*			
High Rise Evacuation	10*			
Stairwell Support	10*			
Totals:	53	19	15	6

Can often be handled by the first due officer.

* At maximum and high-risk fires, additional personnel may be needed.

See the definitions on the previous page

1st Alarm Assignments

Critical Tasks (minimum personnel)

Low Rise Residential Structure Fire

Task	Number of Personnel
Command/Safety	2
Pump Operations	1
Attack Line	4
Search and Rescue	2
Ventilation	2
RIT	4
Other (hydrant)	1
Total	16

Alarm Assignment by Apparatus

Low Rise Residential Fire

Unit Type	Number of Units	Total Personnel
Pumper	2	8
Truck	1	4
Other (Pumper/Truck/Rescue)	1	4
Battalion Chief	1	2
Total Staffing Provided		18
Total Staffing Needed		16

Critical Tasks (minimum personnel)

Moderate Risk Commercial Structure Fire

Task	Number of Personnel
Command/Safety	2
Pump Operations	2
Attack Line	4
Search and Rescue	4
Ventilation	4
RIT	4
Other	2
Total	22

Alarm Assignment by Apparatus

Moderate Risk Commercial Fire

Unit Type	Number of Units	Total Personnel
Pumper	2	8
Truck	2	8
Other (Pumper/Truck/Rescue)	1	4
Battalion Chief	1	2
Total Staffing Provided		22
Total Staffing Needed		22

Critical Tasks (minimum personnel)

High Risk Commercial Structure Fire

Task	Number of Personnel
Command/Safety	4
Pump Operations	2
Attack Line	6
Search and Rescue	4
Ventilation	4
RIT	4
Other	2
Total	26

Alarm Assignment by Apparatus

High Risk Commercial Fire

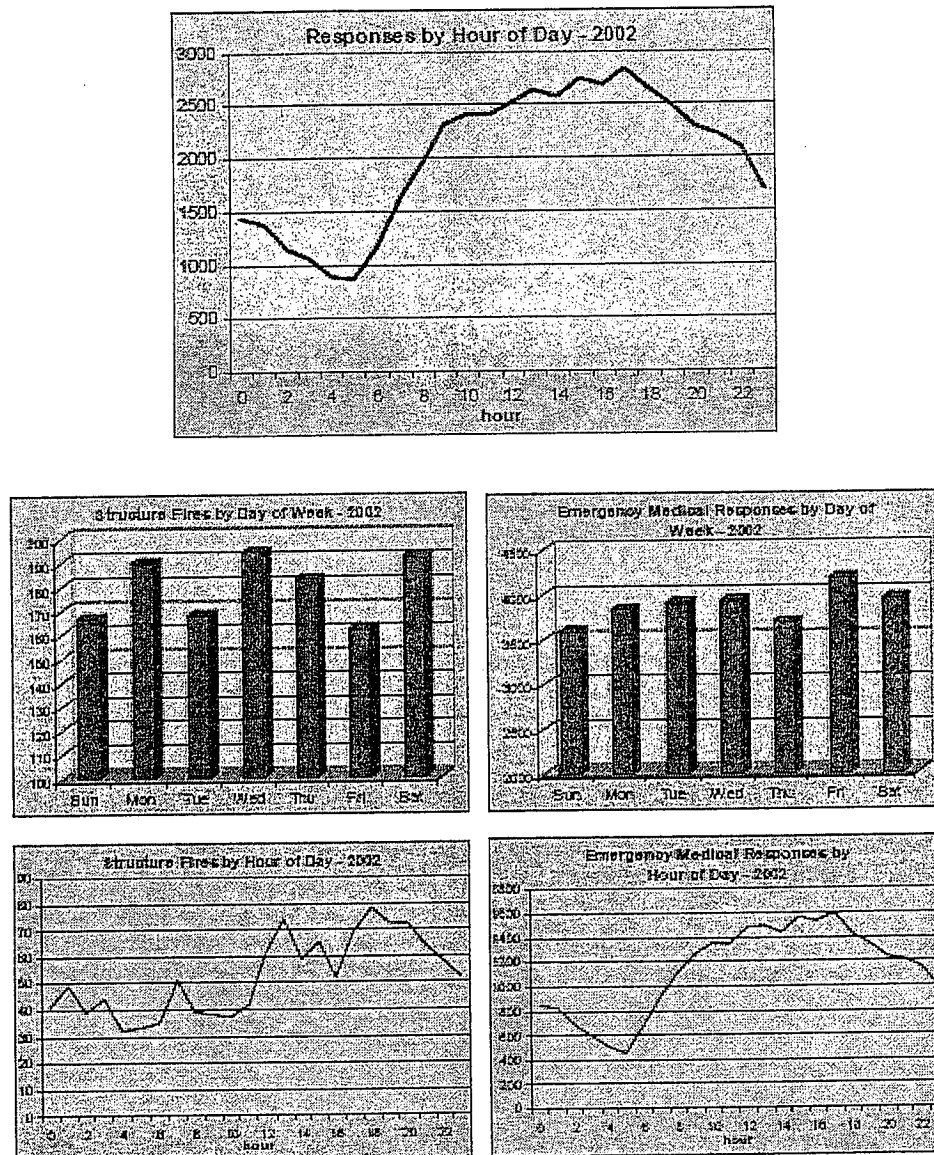
Unit Type	Number of Units	Total Personnel
Pumper	3	12
Truck	2	8
Rescue	1	6
Other (Pumper/Truck/Rescue)		
Battalion Chief	2	4
Total Staffing Provided		30
Total Staffing Needed		26

Kansas City Fire Department Deployment Analysis; December 2003
<http://www.kcmo.org/fire/deploymentanalysis.pdf>

Deployment Strategies

I. Kansas City, Missouri - 2003

Fire & EMS Response by Day and Hour

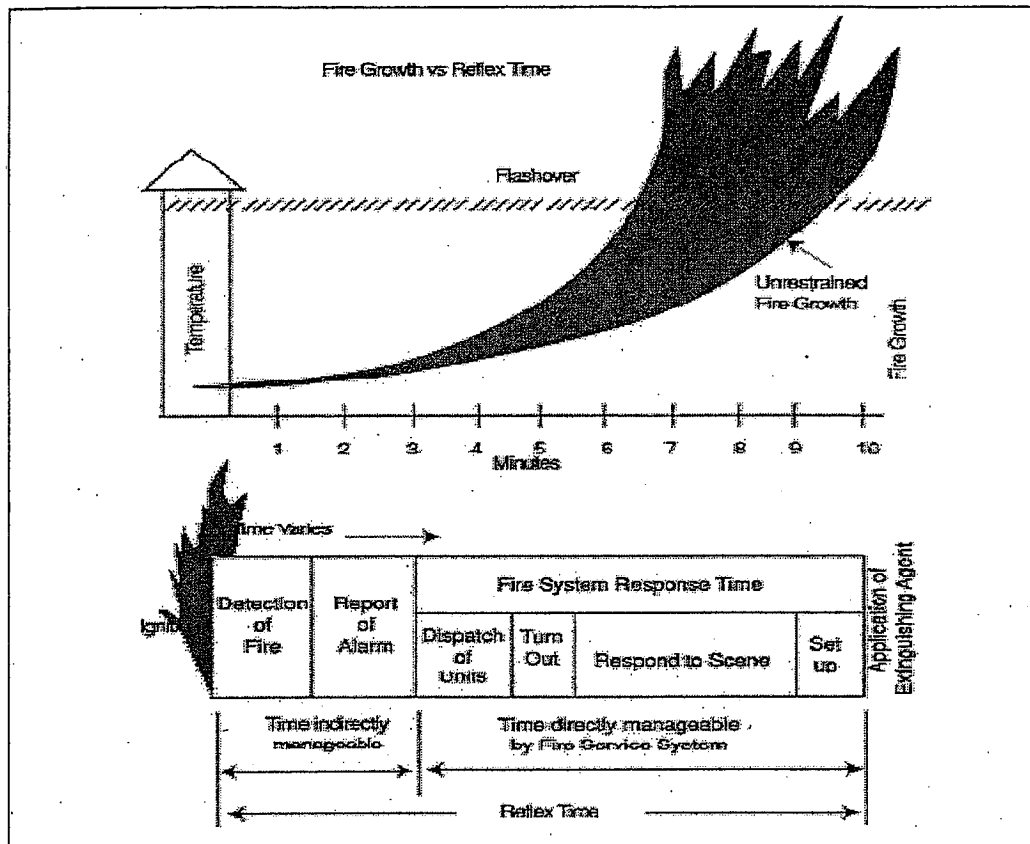


(pg. 17)

Graphs display time and day tendencies of fires and response times per day/week. "Response activity tends to increase during the day and evening hours and decreases during the night." The report reasons that more people are active during the day and increase likelihood of accidents.

Resource workload section: "workload on emergency response units is a large factor in response time performance. The busier a unit, the less available it is for the next emergency. If a response unit is unavailable, then a unit from a more distant station must respond." This would result in a slower response time.

The ultimate goal of emergency service delivery is to provide a response time that arrives before the “flashover” period. The flashover period is the time when flammable gases rise to the ceiling reach the ignition temperature and ignite the entire room. Flashover usually occurs five to eight minutes after the initial flame.



Source: Commission on Fire Accreditation, International

The policies and practices of the fire department directly influence the final four of the steps (dispatch of units, turn out, respond to scene and set up), but the initial two steps are only indirectly manageable (detection of fire and report of alarm).

Issues Affecting Response Time Performance

1. **Geography**-30% of calls to locations outside the four minute travel zone around an area of an existing fire station. It is clear that there are areas of the city that are well beyond the reach of a fire station given current response time targets.
2. **Turnout time**-NFPA 1710 established a performance target of 60 seconds or less; hard to figure a time for KCFD as the department keeps only the enroute time; study revealed however that there was a large difference between day and night time turnout time. Also longer response times between 9-11 am; Department staff attribute this to training that normally occurs during this same period.
3. **Unit Availability**-Number of times the primary response unit was unavailable for an incident. (Contributes to longer response times)

KCFD Re-Deployment Plan

Comparator	Current	Proposed
Number of Stations	33	34
Number of Pumpers	31	34
Number of Quints	2	0
Number of Trucks	12	14
Number of Rescues	5	3
Number of Battalion Chiefs	7	7
Minimum number of on-duty personnel	187	221
Geographic coverage within a five minute response time	177 square miles	196 square miles
Percentage of year 2002 incidents within five minutes of a fire station	91%	91%

Map of fire stations proposed by study results: 34 stations identified, which includes building a new station, and moving some stations around to more strategic locations. Three stations are closed, four new stations are added and a number of stations are relocated from their current position to improve overall response coverage.

With the proposed changes 91% of year 2002 incidents fall within the five minute response coverage deployment pattern. This plan also provides a 10% improvement in geographic coverage of the city, mostly in areas that are experiencing additional development and population growth.

Mobile Urban Rescue Units

The fire department reduced the number of pumpers and trucks and replaced squads with urban rescue units capable of responding to most emergencies; this greatly decreased maintenance costs

One of the goals from the plan named "Fire Department in the 21st Century" was to have more fire fighters at the scene with less equipment. The units could deliver more staff using fewer vehicles, and this cut down on response time somewhat.

They found that the response times are faster in areas with higher work loads as the busiest battalions had generally faster response rates.

Fire fighting force resource allocation audit-Kansas City September 2000
<http://www.kcmo.org/auditor/00-01audits/fireresource.pdf>

II. Virginia Beach, Virginia – 2004

Fire Facilities

The City is continuing efforts to address the age and condition of existing Fire and Rescue Stations, as well as targeting new areas growth that require additional service. Replacement and relocation of three existing facilities is included in the Capital Improvement Program. The First Landing Station is to be located at Shore Drive and Great Neck Road and will replace the existing Ocean Park Fire and Rescue Station. The Thalia Fire and Rescue Station is due to be relocated to a larger site in the Pembroke area and the Chesapeake Beach Fire and Rescue Station is also included for relocation near the current site. **These enhancements will expand response capabilities through the addition of ladder trucks and reduce response times by positioning resources in more optimal locations with higher demand for service.**

http://www.vbgov.com/dept/mgmtsvcs/vgn_files/fy04/fire.pdf

Fire Inspection Strategies

Service Delivery

I. Kansas City, Missouri – 2006

The fire prevention unit is comprised of two chief officers, four state certified investigators, two public educators and eighteen state certified inspectors. The department conducts more than 14,000 inspections of commercial, educational, institutional (healthcare and correctional) and multifamily residential housing annually. Presently fire fighters only conduct walk through for pre fire planning purposes only.

Email correspondence from Cpt. John Hastings, KCFD Fire Prevention Division, September 20, 2006

Advantages and Disadvantages with using Fire Company Inspections

Advantages: A company-level inspection program has several benefits. Using fire suppression staff increases the number of people available to do inspection and prevention work. Fire suppression staff can collect information that can be used for pre-incident planning and become familiar with specific buildings before an emergency.

Disadvantages: Implementing a company-level program may be costly. Fire suppression staff need additional training before doing the inspections. Adding responsibilities may require increasing compensation. In addition, some firefighters may have negative feelings about conducting inspections. Most fire suppression staff are interested in fighting fires; fire prevention is a different kind of work.

Kansas City Performance Audit-August 2002

<http://www.kcmo.org/auditor/02-03audits/fireprevention.pdf>

II. Olympia, Washington – 2004

The department uses the "Life Safety Line of Business" to inspect properties in the City; most of its peer departments use fire company inspections and use less professional inspectors; Olympia does not use company inspections-all inspections are done through the inspection department labeled Life Safety.

Olympia Fire Department: Fire and Emergency Medical Services Master Plan, 2004

<http://www.ci.olympia.wa.us/citygovernment/codes/firemasterplan/>

III. Denver, Colorado - 2005

Approximately 85% of inspections are conducted by fire fighters assigned to various stations. The remaining 15% are technical inspections conducted by the Bureau which fall into the following classifications: hazardous materials, flammables, institutional buildings (schools and hospitals), and high rise buildings. The Denver Fire Department completed 98% of its annual inspections during 2004.

Denver's Fire Safety Inspection Program Performance Audit, 2005

<http://www.denvergov.org/admin/template3/forms/FireSafetyInspectionProgramReport.pdf>

IV. Dallas, Texas

Fire fighters inspect small businesses, shopping centers less than four stories high, and office complexes. They use professional inspectors to perform the complex inspections.

Kansas City Fire Prevention Audit-August 2002 (Dallas example within Kansas City Report, pg 12)
<http://www.kcmo.org/auditor/02-03audits/fireprevention.pdf>

V. Portland, Oregon - 2006

Personnel from the local firehouse inspect smaller properties, such as low-rise apartment buildings and some smaller businesses. These are referred to as "Company Fire Inspection Program Inspections". Larger and more complex occupancies, such as high-rise building "cores" (fire suppression and detection systems, and common area egress components generic to the entire building), factories, hospitals, schools, theaters, etc., require inspections by personnel from the Prevention Division (Fire Marshal's Office Code Enforcement and Investigation Sections). These inspections require specialized training for fire and smoke detection systems, alarms and much more.

Portland Fire and Rescue, Fire Prevention Division 2006
<http://www.portlandonline.com/shared/cfm/image.cfm?id=114175>

VI. City of Kent, Washington – 2006

Plan Review

Calling for Inspections:

Interactive Voice Response (IVR) is an automated system that allows you to schedule, reschedule, and cancel building inspection using a touch-tone telephone. You can also retrieve inspection results through IVR.

<http://www.ci.kent.wa.us/fireprevention/planreview/index.asp>

VII. Kansas City, Missouri – 2003

Strategic Plan Goal for Inspections:

To examine alternative fire inspection approaches that could increase efficiency, effectiveness and decrease hazards

- Research possibilities for electronic notification.
- Research possibilities for mailing notification.
 - o Determine cost
- Develop new inspection form.
- Produce an annual cost recovery statement to determine permit cost.
- Research the cost of a mandatory permit for every inspection.
- Research possible change in re-inspection practices.
- Ensure the highest quality of customer service to the properties we inspect.
 - o Research Pre-notification program.

- o Develop educational brochure.
 - o Hold informational seminar for local business and commerce associations.
- Develop an after-hours inspection program for problem businesses or late operating businesses within six months.
 - o Profile problem businesses.
 - o Identify possible approaches.
 - o Develop program.
 - o Implement program.
 - o Document results.
 - o Modify program based on need.

Kansas City Fire Department Strategic Plan, November 2003
<http://www.kcmo.org/fire/strategicplan.pdf>

Communication

Kansas City, Missouri – 2002

The Fire Prevention Division's list of addresses to inspect is not complete and the process used to update the list is not effective. Because the division relies on its existing address list to plan inspections, places not already on the list are not assigned to inspectors and are less likely to be inspected. Other city departments have address information that could be used to update the address list and ensure that establishments are inspected.

About 25% of commercial properties we reviewed were not in the department's database. In addition to information gathered by inspectors, the division could use other sources of address information. Other city departments maintain information on commercial activities and construction that could be used to update and maintain the fire prevention database. For example, commercial water accounts, food inspections, business licenses, and the Codes Administration Department are potential sources of information that the Fire Prevention Division could use to periodically add new addresses to its inspection address list. Once the division has formally defined what properties they intend to inspect, fire prevention managers and the Information Technology Department should work together to use other city information to update the list of places Fire intends to inspect.

Kansas City Fire Prevention Audit-August 2002
<http://www.kcmo.org/auditor/02-03audits/fireprevention.pdf>

Counting

I. City of Denver, Colorado – 2005

We recommend that the Fire Department assign inspection by geographical areas {based on National Science Foundation study} and combine this with a systematic street-by-street check off.

Denver's Fire Safety Inspection Program Performance Audit, 2005
<http://www.denvergov.org/admin/template3/forms/FireSafetyInspectionProgramReport.pdf>

II. NFPA

Cities that defined inspectors' duties in terms of geographic areas instead of particular buildings to be covered appeared to be more successful in inspecting all buildings.

Portland Audit: Commercial Building Fire Inspections Audit, September 2000

Fire Code Inspections and Fire Prevention: What Methods Lead To Success? NFPA, John Hall Jr. 1980. pg. 15
<http://www.portlandonline.com/shared/cfm/image.cfm?id=5730>

III. Dallas, Texas - 2003

The department places initial and re-inspections in two separate categories. In the report categories included: inspections, re-inspections, code contacts, special tests, reviewed plans, and failed contacts (businesses that were closed).

Dallas Fire Rescue Activity Report, 2002-2003

<http://www.dallasfirerescue.com/2002-2003annual.pdf>

IV. Kansas City, Missouri – 2006

Re-inspections are not counted separately from initial inspections- currently they are all found in one category of inspections

Email correspondence from Cpt. John Hastings KCFD Fire Prevention Division September 20, 2006

V. Denver, Colorado - 2006

The Denver Fire Department uses Visionary System Inc.'s Firehouse® fire inspections database, which has the flexibility we need to address multiple tenants under a single address. This is critical to the Department's inspections program, since the City levies fees for annual fire safety inspections. There are various scenarios under which multiple properties/tenants are considered under a single address. We do our best to accommodate each property owner's request as to whether (a) each tenant is billed separately or (b) the property owner prefers to receive the entire invoice and then bill the different tenants. Our preference is the former.

Following is more detail on two of the most common of these types of properties:

Strip malls / covered shopping malls - For inspection record purposes, each tenant space is given a unique address (i.e., Suite A, Suite B) that gives us the ability to track the number and name of each tenant. The record for each tenant address in our system includes specific tenant information (i.e., name of business, occupancy use, square footage and emergency contact information) and also provides billing flexibility demanded by various property owners or management. It also gives us the ability to have a separate inspection form for each tenant, making it clear which tenant had violations; this eliminates confusion as to which tenant on a common inspection form is in violation.

Residential complex - For inspection record purposes, each building of a residential complex is given a unique address (i.e., Building 1, Building 2). This gives us the ability to track the condition of each building, ensuring that each building receives a comprehensive inspection and also provides billing flexibility demanded the property owner or management.

The breakdown of multiple tenants (strip or enclosed malls or residential buildings under one address) is for inspection/billing purposes only. For purpose of reporting the number of inspections conducted, the Denver Fire Department counts only the primary street address for these types of properties.

Email correspondence from Joseph L. Gonzales, Division Chief, Denver Fire Department Fire Prevention and Investigation Division October 6, 2006

Risk-Based Strategies

I. New Bern, North Carolina – 2006

Inspection Schedule

The Fire Prevention Bureau recognizes the inspection schedule as set forth in the International Fire Code. Listed below are the occupancy classifications and their inspection frequency.

One-Year Cycle:

Occupancy Type: Hazardous, Institutional, High-Rise, Assembly (except those noted below), and Residential.

Exceptions - Residential: One and two family dwellings and only interior common areas of dwelling units of multi-family occupancies

Two-Year Cycle:

Occupancy Type: Industrial and Educational

Exceptions: Public Schools

Three-Year Cycle:

Occupancy Type: Assembly (occupancies with an occupant load less than 100), Business, Mercantile, Storage, Churches, and Synagogues.

Exceptions: City Ordinance dictates that all public and privately-owned buildings within the "Historical District" of downtown New Bern are scheduled on an annual basis.

http://www.ci.new-bern.nc.us/Fire/pr_insp_comm.php

II. Glendale, California – 2003

Fire department inspects properties on a yearly or bi-yearly basis on all buildings depending on the risk factor; The most common target hazard due to loss of life potential, 24-hour occupancy, risk and frequency of events, is depending on the age, locations, size and occupancy load.

Four classifications of risk:

- a. High Probability/High Consequence: multi-family dwellings, single family residential homes in older sections of city, hazardous materials occupancies, shopping centers
- b. Low Probability/High Consequence: Hospitals, senior housing projects, group homes, shopping malls, industrial occupancies, large office complexes, newer upscale homes in high fire hazard areas
- c. High Probability/Low Consequence: Detached family dwellings in non-vegetated flatland areas in town
- d. Low Probability/Low Consequence: Newer detached single family dwellings in non-vegetated areas and small office buildings

Technical Background Report to the 2003 Safety Element, City of Glendale, California

http://www.ci.glendale.ca.us/planning/pdf_files/safety_element/Ch4Fire.pdf#search=%22glendale%20fire%20inspection%20risk%20factor%22

III. Charlotte, North Carolina – 2002

Kansas City Audit referenced Charlotte stating: “inspecting high-risk places more often than low-risk places allows fire departments to focus resources on areas where the risk of death and injury from fire is greater.” They site Charlotte, NC department because they inspect public schools every six months but inspect lower risk places less frequently (chart available from report).

Kansas City-City Audit of Fire Prevention Division, August 2002

<http://www.kcmo.org/auditor/02-03audits/fireprevention.pdf>

IV. City of Bellevue, Washington – 2006

Self-Inspection Program

Program for low risk occupancies – provides tools to business owners to direct their own fire safety analysis. Over 700 existing occupancies currently participate in this program.

“Generally, the checklist provided to you can be easily and quickly completed with a simple review and verification. Review the common fire hazard list on this page and make certain your business meets all the applicable safety conditions.

If you are satisfied that your business meets the basic criteria, simply complete and sign the enclosed verification page and mail in the enclosed self-addressed stamped envelope. We thank you very much for your assistance and you have helped make our program more efficient.”

http://www.ci.bellevue.wa.us/fire_prevention_inspection.htm

V. Portland, Oregon - 2000

Instead of annual inspections of commercial buildings, the Bureau developed a "risk-based" approach to inspections. This approach requires less frequent inspections and involves classifying and inspecting occupancies according to their potential risk.

According to the National Fire Protection Association, "A fire inspection program manager must prioritize inspections so the worst problems are tackled first, and equal treatment is given to all properties within a specific class of risk. Although any number of factors can be used in determining priorities, the same set of factors must be used on a continuing basis if a prioritizing system is to be fair and impartial."

The major features of the Bureau's approach to risk based inspections include:

- Classifying all city commercial buildings in certain categories. Such as, the Bureau uses the Office of Planning and Development Review's nine Uniform Building Codes to classify all inspectable occupancies in Portland.
- Using those building codes, assigning a level of risk and determining frequency of inspections based on type of occupancy whether the occupancy is sprinklered and if it is eligible for the Fire Safety Review program. For example, unsprinklered factories are scheduled to be inspected every other year.
- Developing a five-year inspection schedule based on building class and frequency.
- Projecting how many inspections will be completed and what the estimated backlog will be for each year.
- Creating a less costly "self-inspection" option for certain occupancies.
- The Fire Safety Review program is a self-inspection program and only certain types of occupancies are eligible to participate. To qualify, occupants must be classified as a Business, Factory, Mercantile, or Residential under the Uniform Building Code. In addition, occupants must have no hazards noted during their last inspection and have a zero account balance. Eligible participants are trained to inspect and correct violations in their own occupancies. The program costs \$20 to participate. The program is designed to allow qualified low-risk occupants the opportunity to conduct their own Fire Safety Review during certain years and not be required to pay for a regular fire code inspection.

The Bureau began implementing its risk-based inspection schedule on July 1, 2000.

Portland Audit: Commercial Building Fire Inspections Audit, September 2000

<http://www.portlandonline.com/shared/cfm/image.cfm?id=5730>

False Alarms

I. NFPA General Statistics – 2004

Table 1
Estimates of False Alarms by Type, 2004

	<u>Estimate</u>	<u>Percent Change From 2003</u>	<u>Percent of All False Alarms</u>
Malicious Mischievous False Call	249,000	-17.3	11.8
System Malfunction	739,500	-7.1	35.1
Unintentional Call	801,500	+3.7	38.1
Other False Alarms (Bomb Scares, etc.)	316,000	-1.3	15.0
Total	2,106,000	-3.8	

Source: NFPA's Survey of Fire Departments for 2004 U.S. Fire Experience.

False Alarm Activity in the U.S., 2004

<http://www.nfpa.org/assets/files/PDF/OSFDcalls.pdf>

II. Model Fire Alarm Ordinance – 2001

The locality should form a fire alarm advisory board when creating this ordinance. The ordinance is based on a registration system with appropriate controls to facilitate false alarm reduction. Local authorities should consider software systems to track and enforce the ordinance. The ordinance contains fire official control and administration, fire alarm company responsibilities, and requires the disciplined use of fire alarm systems by owners. Major components of model ordinance:

- Registration of fire alarm system
- System certification (by Enforcement Official)
- Inspection, Testing & Maintenance (inspect at least once per year)
- Nuisance fire alarms – owners must submit Report of Repair w/in 15 days
- Service fees (after 3 false alarms in one calendar year)
- Increasing penalties for non-compliance/failure to pay fees, incl. revoking occupancy certificate
- Appeals

Model Fire Alarm Ordinance, August 2001

<http://www.faraonline.org/ModelFireOrdinance.pdf>

III. Burlington, North Carolina – Effective 2004

False Alarm Fees

Civic penalty for excessive false alarms and failure to obtain applicable alarm permit:

Failure to Obtain Alarm Permit – Any person or firm that fails to register their alarm system with the City of Burlington Alarm System Coordinator shall be subject to a civil penalty of one hundred dollars (\$100.00).

Excessive False Alarms – Four or more false alarms within a permit year is excessive.

Civil Penalties – Excessive false alarms for any alarm system within a permit year shall subject the alarm user to a civil penalty according to the following schedule.

Failure to respond – If a keyholder does not respond within thirty (30) minutes of the alarm, it will be counted as a false alarm.

Number of False Alarms	Fire Civil Penalty
Four or Five	\$100.00 each
Six or Seven	\$200.00 each
Eight or Nine	\$300.00 each
Ten or More	\$500.00 each

<http://nc-burlington.civicplus.com/index.asp?NID=574>

Fire Equipment

Preventative Maintenance

I. Portland, Oregon – 1999

In 1999, the Fire Apparatus Maintenance unit performs preventive maintenance on first line apparatus every six months and on reserve units once per year. The Fire Apparatus Maintenance unit also provides 24-hour emergency maintenance support to Fire operational units. If operations were to be merged with Fleet Services Division, these outcomes were promised to remain the same.

Savings will be greatest if the Fire Bureau fleet coordination duties are done by the existing Fire Bureau organization. In addition, consolidation should not result in a meaningful reduction of service level or maintenance quality. If consolidation is pursued, several key actions should be taken to provide reasonable assurance that savings are realized and service quality is maintained.

- Develop a detailed operational agreement
- Establish formal communication and customer service systems
- Reduce transition problems through retention of experienced fire mechanics
- Track fire apparatus maintenance and repair costs to enable reporting of the actual savings to City Council

Portland did not consolidate operations.

Report to the Mayor of Portland in *Maintenance and Project Delivery Work Group*– March 2004:

Previous efforts have studied consolidation of BGS Vehicle Services with Fire Apparatus maintenance. These efforts concluded that savings were possible, but service needs of the Fire Bureau were cited as reasons not to merge. In addition, the Fire Bureau made budget reductions equivalent to the forecast reductions.

In FY 99-2000 PF&R made significant budget cuts in its Logistics Program to virtually eliminate any cost savings that could be generated from consolidation. These cuts included two supervisory positions and one Emergency Vehicle Technician.

<http://www.portlandonline.com/shared/cfm/image.cfm?id=89041>

City of Portland's Consolidation of Fire Apparatus Maintenance with the Fleet Services Division: An Analysis of Potential Savings, March 1999

<http://www.portlandonline.com/shared/cfm/image.cfm?id=5695#search=%22City%20of%20Portland%20Consolidation%20of%20Fire%20Apparatus%20Maintenance%20with%20the%20Fleet%20Services%22>

II. Tampa, Florida – 2000

In January 2000, the Fire Maintenance Division implemented a revised Preventive Maintenance Program. The goal of the program was to have all vehicles in the Fire Department inventory receive preventative maintenance service three times a year. Research conducted during prior audits indicated that an industry standard of 70% of direct labor hours to total hours seemed feasible. We compared the mechanics direct labor time to the 70% standard. We observed they achieved a 60% level.

Tampa Fire Rescue Department: Fire Vehicle Maintenance Audit, October 2000

http://www.tampagov.net/dept_internal_audit/files/00/0007.pdf#search=%22tampa%20fire%20rescue%20department%20fire%20vehicle%20maintenance%20division%22

Replacement Standards

I. Loudon County, Virginia – 2006

There is no national standard governing the replacement of emergency vehicles. Volunteer departments in the County generally replace apparatus based on wear and tear, recurrent maintenance costs and active maintenance history, age of the apparatus, technology and safety changes, and available funding.

The service plan recommends the following replacement standard for emergency response fire and rescue apparatus (Table 22). The driving force in making these determinations is the time period the emergency vehicle is in service, and the advancement in Fire/EMS apparatus safety elements that occurs over this time period. Additionally as the County continues to grow, requests for service will continue to increase, adversely impacting the wear and tear factor on these vehicles.

Table 22 - Vehicle Replacement Standard (years of service)

Apparatus Type	Front Line Service ⁴²	Reserve Service
Engine (pumper)	10	5
Ladder Truck	12	5
Heavy Squad	12	5
Tanker	15	5
Brush Truck	15	5
Ambulance	4	3

Note: The Insurance Service Organization's Fire Suppression Rating Schedule requires one spare Engine per eight required, and one spare ladder per eight required.

Replacement Criteria

Currently assistance with vehicle replacement by the County occurs when requested by a volunteer company. Each request is prioritized based on the following criteria:

- Age of vehicle
- Company activity level
- Maintenance costs and maintenance history
- Vehicle reliability
- Personnel safety
- Vehicle use
- Funding availability. Is the company requesting:
 - 100% funding (hardship request)
 - 50% County-50% Company
 - 70% County-30% Company
 - 30% County-70% Company
- Total number of vehicle types currently in service within the company
- Capital Intensity Factor requirements
- Available funding in the current CIP budget cycle

⁴² Vehicle age is the initial trigger for considering replacement. However, items such as wear and tear, increasing maintenance costs, safety discrepancies, unit activity level, and response area travel and road conditions may be cause for earlier replacement of a unit than that outlined in Table 22.

Other Jurisdictions' Replacement Standards (years of service)

Locality	Engine	Ladder	Tanker	Heavy Squad	Ambulance
Henrico County, Virginia	Front Line: 12 Reserve: 3	Front Line: 15 Reserve: 5	20 years total	Front Line: 12 Reserve: 3	Front Line: 7 Reserve: 1
Chesterfield County, Virginia	Front Line: 20 Reserve: 5	Front Line: 20 Reserve: 5	Front Line: 20 Reserve: 5	Front Line: 20 Reserve: 5	Front Line: 7 Reserve: 5
Spotsylvania County, Virginia	Front Line: 12-18 170,000 miles	Front Line: 12-18 170,000 miles	Front Line: 12-15 170,000 miles	No report.	Front Line: 8-10 200,000 miles
Howard County, Maryland	Front Line: 10 Reserve: based on condition	Front Line: 15 Reserve: based on condition	Front Line: 15 Reserve: based on condition	Front Line: 15 Reserve: based on condition	Front Line: 5 Reserve: based on condition

Loudoun County Fire and Rescue Service Plan, June 2005

http://inetdocs.loudoun.gov/fire/docs/lcfrsystemservi_/serviceplan2005/serviceplan2005.pdf

II. Tallahassee, Florida – 2006

The City's established life expectancy for fire response vehicles is 11.9 years. The City conducted an informal survey of 25 municipal fire departments – 22 keep their fire trucks an average of 16.1 years, with minimum of 8 years, and maximum of 25 years. Tallahassee's minimum is 10 years and maximum is 20 years.

By only considering those vehicles sold, the salvage rate the City received was 13.7%. The City's estimated salvage rate used in calculations for vehicle replacement rate is 10%. Since the City is earning a better salvage rate than expected, it could be indicative that the vehicle's useful life could be extended.

Tallahassee Audit of Fire Operations, 2006

<http://talgov.com/auditing/auditpdfs/0612-firedeptops.pdf>

III. New York City, New York – 2005

It has a procurement policy that replaces a front-line vehicle beginning 27 months prior to the vehicle's eleven-month anniversary. This procurement policy ensures that a vehicle approaching 11 years of age will be replaced before its eleventh year.

City of New York's Front Line Replacement Policy, 2005

http://www.comptroller.nyc.gov/bureaus/audit/PDF_FILES/MH05_073A.pdf

IV. Fire Apparatus Manufacturer's Association – 2004

Survey of 1200 fire chiefs (30% response rate)

Life Expectancy- Years in active service (average expected):

	Urban	Suburban	Rural
Newest Pumper:	15	16	18
Newest Aerial:	18	19	21
Newest Rescue:	13	15	16

Life Expectancy – Years in Reserve Service (average expected):

	Urban	Suburban	Rural
Newest Pumper:	10	11	14
Newest Aerial:	9	10	13
Newest Rescue:	7	7	11

Annual Apparatus Usage- Total Miles Driven in Last 12 Months

	Urban	Suburban	Rural
Newest Pumper:	7,629	4,992	3,034
Newest Aerial:	5,083	3,492	2,155
Newest Rescue:	7,534	6,087	3,946

Idle Time (hours per week)

	Urban	Suburban	Rural
Newest Pumper	11	10	6
Newest Aerial	8	7	5
Newest Rescue	13	9	8

.Fire Apparatus Manufacturer's Association's Fire Apparatus Duty Cycle White Paper, 2004
<http://www.fama.org/Committees/Technical/Apparatus%20Use%20White%20Paper%2008-10-04.pdf>

V. Detroit, Michigan – 2001

We recommend the DFD implement a systematic replacement program to replace all first-line engines every ten years and all first-line ladder trucks every fifteen years.

City of Detroit's FD Fire Fighting Division Resources – F/U of Latest Performance Audit, 2001:

<http://www.ci.detroit.mi.us/legislative/charterappointments/AuditorGeneral/Reports/Fire%20Dept%20Follow%20up%20Audit%20web%20edition.pdf#search=%22City%20of%20Detroit%20Fire%20Fighting%20Division%20Resources%20Latest%20Performance%20Audit%22>

Best Practices

I. Minnesota – 1999

Joint Purchasing-The Minnesota Fire Agencies Purchasing Consortium is organized and run by local fire departments to purchase commonly replaced items such as pager batteries, office supplies, turn out gear, etc. at substantial savings. In this way multiple governments can benefit without each actually going through a separate bid system and increasing

Intergovernmental Contracts for Service- One jurisdiction provides service on behalf of others in exchange for payment. These contracts allow participating governments to effectively and efficiently use trained personnel, and facilities in ways unconstrained by municipal boundary lines, while meeting demands of the citizens.

Consolidation- Combining fire departments from smaller communities has the potential of providing higher levels of service to residents at lower costs; sharing costs over a large base enables a department to afford highly trained personnel; also saves money through reduction of duplicate positions or unneeded equipment.

Standardizing Equipment (Duluth, MN)-Department saves money through purchasing standardized equipment and apparatus. The fire trucks have the same automatic transmissions, engines, and chassis; they all contain the same radios, walkie talkies, etc. Relying on standardized components and bypassing customized trucks, the department saves \$20,000 per vehicle on purchasing and maintenance costs.

Office of the Legislative Auditor, State of Minnesota: *Best Practices Review*, April 1999
<http://www.auditor.leg.state.mn.us/Ped/pedrep/9907-all.pdf>

II. Kansas City, Missouri – 2003

Goal in Strategic Plan: To develop an apparatus acquisition plan that meets the emergency response needs of the community:

- Review previous fleet acquisition plan.
 - o Identify and acquire any additional industry standards for apparatus replacement.
- Identify industry standards for fire apparatus design.
 - o Review all applicable NFPA, DOT and OSHA standards/guidelines.
 - o Survey selected fire personnel for likes/dislikes regarding current apparatus design and function.
 - o Develop plan for apparatus design based on Strategic Plan deployment analysis.
- Identify existing budget and financial options.
 - o Review available information/mechanical history of each apparatus concerning economic life and replacement of fire apparatus.
 - o Identify and review current budgeted funds for apparatus acquisition and payment schedule.
 - o Develop apparatus acquisition plan based upon design and funding.

- o Make fire apparatus acquisition plan recommendation to LMSC.
- o Establish an evaluation plan to meet the objective outlined in the apparatus acquisition plan.
- o Coordinate the evaluation of the plan with other affected committees (Operations, Professional Development, etc.).

Kansas City Fire Department Strategic Plan, November 2003

<http://www.kcmo.org/fire/strategicplan.pdf>

Firefighter Work Schedule

Firefighter Work Schedule

I. City of Alexandria, Virginia – 2006

Fire Suppression: 56- Hour Week

Work 24 hours	Off 24 hours
Work 24 hours	Off 24 hours
Work 24 hours	Off 4 Days

In one year, a firefighter on the 56-hour work week schedule works 728 hours above the number worked by a 40-hour employee. If applied to a twenty-five-year career, the 56-hour employee will have worked an additional 8.75 years, or the equivalent of 33.75 40-hour/week years.

EMS: 42- Hour Week

Work 24 hours	Off 48 hours
Work 24 hours	Off 4 Days

Fire Communications: 42- Hour Week

Work 12-hour Day	12 hours off at night
Work 12-hour Day	24 hours off
Work 12-hour night	12 hours off in day
Work 12-hour night	Off 4 Days

In one year, employees on the 42-hour work week schedule work 104 hours above the number worked by a 40-hour employee. If applied to a twenty-five-year career, the 42-hour employee will have worked an additional 1.25 years, or the equivalent of 26.25 40-hour/week years.

Deputy Fire Marshals

4 work shift

Days: 7am – 7pm for two days

Nights: 6pm-6am for two days

Four days off

2 work day work Monday through Friday

1 works 6:30am-3:30pm

1 works 8:30am-4:30pm

Fire Inspectors

2 work early Monday through Friday: 7am- 3:30pm

5 work regular Monday through Friday: 8:30am- 4:30pm

2 work shifts

1 works Tuesday through Friday: 11:30am – 8pm

1 works Saturday through Tuesday:

Saturday and Sunday 7am-5:30pm

Monday and Tuesday 10:30am – 8:30pm

http://www.ci.alexandria.va.us/fire/shift_schedule.html

II. Los Angeles, California – 2006

Members of the LA Fire Department working at Neighborhood Fire Stations are assigned to one of three rotating 24-hour long shifts (or “Platoons”). You can identify which Platoon (A, B, or C) is on duty by viewing the color-coded calendar below. LAFD Firefighters work as a team with members of the same Platoon at the same Neighborhood Fire Station for an entire 24-hour period. They are relieved as a group at 6:30am each day by the next scheduled Platoon. This is a 24 hour on, 48 hour off schedule.

www.lafd.org/shift.htm

III. Elizabeth City, North Carolina – Effective 2004

The work period for nonexempt personnel working a 24-hour-per-day schedule shall consist of 27 days beginning and ending at 0800 hours. The 27-day work period will result in three shifts working an equal amount of scheduled hours (216) in a work period. This is a 24 hour on, 48 hour off schedule.

Elizabeth City Departmental Work Schedules Standard Operating Guidelines, September 2004
http://www.ecfdlife.org/SOG/DEPARTMENTAL_WORK_SCHEDULES.pdf

Salary

I. ICMA Survey – 2003

		As of January 2003	
Part I		Police (Average)	Fire (Average)
Full-time paid employees		132	91
Full-time sworn officers and firefighters		100	77
Part-time paid employees (officers, firefighters, and civilian)		13	7
Volunteers		12	26
What is the minimum annual base salary paid to sworn full-time police officers and firefighters. (Do not include uniform allowance, holiday pay, hazard pay, longevity pay, or any other additional compensation.)		35,162	32,888
What is the maximum annual base salary paid to sworn full-time police officers and firefighters?		48,733	44,511
How many years of service are required before personnel without promotional rank receive the maximum annual base salary?		6.8	7.1
Can personnel receive longevity pay?	Yes 91.9 No 8.1	Yes 91.6 No 8.4	

Average annual salary ranges for benchmark positions as of January 1, 2003.

Police	Minimum salary (\$)	Maximum salary w/o longevity (\$)
Police Corporal	39,906	50,029
Police Sergeant	48,278	57,903
Police Lieutenant	54,222	65,331
Police Captain	59,794	73,563
Deputy Chief	62,060	77,402
Police Chief	71,055	89,319

Fire	Minimum salary (\$)	Maximum salary w/o longevity (\$)
Engineer	39,633	50,098
Fire Prevention/Code Inspector	42,083	52,590
Fire Lieutenant	43,769	51,356
Fire Captain	47,723	57,001
Battalion Chief	57,219	71,813
Assistant Fire Chief (2nd below Fire Chief)	57,904	72,564
Deputy Chief (1st below Fire Chief)	60,105	75,101
Fire Chief	66,826	85,190

Note: The *Police and Fire Personnel, Salaries, and Expenditures* surveys were mailed in the winter/spring of 2003 to all municipalities with populations 10,000 and over. Of the 3,215 cities, towns, villages, boroughs, and townships that received surveys, 1,645 responded (51.2%).

Police and Fire Personnel, Salaries, and Expenditures, 2003

www2.icma.org/upload/bc/attach/%7BAC36159B-4E25-4A2C-AB6E-E051B85CB128%7Dpfs03web.pdf